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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/805,596	03/19/2004	Daniel L. W. Chieng	ELAN-01187US1	1464

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EXAMINER	
YAARY, MICHAEL D	

ART UNIT	PAPER NUMBER
2193	

NOTIFICATION DATE	DELIVERY MODE
07/23/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OFFICEACTIONS@FDML.COM

Office Action Summary	Application No.	Applicant(s)	
	10/805,596	CHIENG ET AL.	
	Examiner	Art Unit	
	MICHAEL YAARY	2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 May 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,7-12 and 19-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,7-12 and 19-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/20/2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application.
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1, 2, 7-12, and 19-29 are pending in the application.

Response to Arguments

2. Applicant's arguments filed 05/11/2010 have been fully considered but they are not persuasive. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Applicant further argues that Thompson does not teach or suggest said selecting the single one of the independent sets of filter coefficients is performed prior to receiving the audio input signal, independent of the audio input signal, and independent of the filtered audio output signal; and the same single one of the sets of filter coefficients selected is used to produce the filtered audio output signal. Applicant also argues that

the other four references do not teach or suggest the deficiencies of Thompson. Examiner respectfully disagrees. It's the references when taken in combination as a whole that teach the claimed limitations not solely the reference of Thompson; and more specifically, as in the citations with respect to the references of Luthra and Konishi in the rejection below.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 2, 7, 10-12, 19, and 22-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki (US Pat. 4,841,828) in view of Luthra et al (hereafter Luthra) (US Pat. 5,023,825), Thompson (US Pat. 5,928,313), Adams et al. (hereafter Adams)(US Pat. 5,471,411) and Konishi et al. (hereafter Konishi)(US Pat. 4,727,505)

Suzuki, Luthra, Thompson, Adams, and Konishi were cited in the previous office action dated 12/11/2009.

5. **As to claim 1,** Suzuki discloses a method comprising:

Storing a plurality of independent sets of filter coefficients in a memory, wherein each set of filter coefficients defines a different polyphase filter function, wherein each of the different polyphase filter functions would result in at least some modifying of a signal if the signal were filtered in accordance with the polyphase filter function, and wherein each of the different polyphase filter functions would result in modifying of a signal in a different manner than the other polyphase filter functions (Abstract; column 9, lines 12-20; and column 22, lines 40-58).

6. Suzuki does not explicitly disclose selecting a single one of the independent sets of filter coefficients and said selecting the single one of the independent sets of filter coefficients is performed prior to receiving the audio input signal, independent of the audio input signal, and independent of the filtered audio output signal. However, Luthra discloses selecting a single one of the independent sets of filter coefficients (Abstract and column 2, lines 9-28 disclose a filter obtaining an output sample rate by utilizing an appropriate set of coefficients, from a plurality of sets, from a particular bin; thus selecting an independent set of filter coefficients.) and said selecting the single one of the independent sets of filter coefficients is performed prior to receiving the audio input signal, independent of the audio input signal, and independent of the filtered audio output signal (Column 2, lines 9-28 disclose selecting filter coefficient set from the bin independently of the input and output).

7. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Suzuki by using the filtering techniques, as taught by Luthra, for the benefit of increasing efficiency in a sampling rate converter. Motivation to combine can be found in that the combination would allow for minimizing memory and maximizing speed in a filter for both video and audio processing (Luthra, column 1, lines 9-14).

8. The combination of Suzuki and Luthra do not explicitly disclose storing a value in a filter selection register and the selecting is based on the value stored in the filter selection register. However, Thompson discloses storing a value in a filter selection register and the selecting is based on the value stored in the filter selection register (column 7, line 56-column 8, line 7, register storing value and obtaining a coefficient set).

9. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Suzuki and Luthra, by reading a value stored in a filter selection register and selecting the first one of the sets of filter coefficients based upon the value, as taught by Thompson, for the benefit of utilizing the hardware fast enough to process incoming samples in real time.

10. The combination of Suzuki, Luthra, and Thompson disclose receiving an audio input signal including a plurality of samples (The combination of references (Luthra, col. 1, lines 15-16) and the knowledge of one of ordinary skill in the art clearly show input can be that of audio, video, etc, used for processing). The combination of references does not explicitly disclose estimating a sample rate of the audio input signal; interpolating the single one selected set of filter coefficients, in dependence on the estimated sample rate of the audio input signal, to thereby produce interpolated polyphase filter coefficients. However, Adams discloses estimating a sample rate of an input signal (column 4, lines 31-53); interpolating the single one selected set of filter coefficients, in dependence on the estimated sample rate of the input signal, to thereby produce interpolated polyphase filter coefficients (abstract and column 4, lines 54-57).

11. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Suzuki, Luthra, and Thompson by performing interpolation, as taught by Adams, for the benefit of varying the output samples of the processed signal.

12. The combination of Suzuki, Luthra, Thompson, and Adams do not disclose convolving the produced interpolated polyphase filter coefficients with the samples of the audio input signal to produce a filtered audio output signal that differs from the audio input signal regardless of which single one of the sets of filter coefficients is selected

and the same single one of the sets of filter coefficients selected is used to produce the filtered audio output signal.

However, Konishi discloses convolving the produced interpolated polyphase filter coefficients with the samples of the audio input signal to produce a filtered audio output signal that differs from the audio input signal regardless of which single one of the sets of filter coefficients is selected (Column 7, lines 27-37 disclose in a digital processor the convolution of an input signal with appropriate coefficient data.) and the same single one of the sets of filter coefficients selected is used to produce the filtered audio output signal (Column 7, line 27-column 8 line 60 disclose using the same stored, selected coefficient data for the convolving).

13. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Suzuki, Luthra, Thompson, and Adams, by performing the convolution operation, as taught by Konishi, in order to process signals containing a large number of high-frequency components, as well as providing a convolution arithmetic circuit suitable for real-time processing of digital signals.

14. **As to claims 2, 12, and 23**, the combination of Suzuki, Luthra, Thompson, Adams, and Konishi do not explicitly disclose the audio input signal is convolved with the interpolated filter coefficients in a sample rate converter of a digital pulse width modulation (PWM) audio amplifier. Examiner is taking official notice that using an audio

signal as input, convolving in a sample rate converter of a digital audio amplifier, and implementing in a PWM amplifier was well known in the art at the time the invention was made.

15. Therefore, it would have been obvious to one of ordinary skill in the art the time of the invention to modify the teachings of Suzuki, Luthra, Adams, and Konishi, by using the well known knowledge of an audio signal as input, convolving in a sample rate converter of a digital audio amplifier, and implementing in a PWM amplifier for the benefit of converting from one sample rate into another sample rate and completing filter operations. Motivation to implement this well known knowledge can be found in that audio or image signals are well known in the art to be used for filtering into an output signal and that PWM amplifiers are often used in telecommunications and audio signals as a method of reducing the total amount of power delivered.

16. **As to claim 7 and 19,** the combination of Suzuki, Luthra, Thompson, Adams, and Konishi disclose the plurality of sets of filter coefficients are stored in a single memory (Suzuki, column 9, lines 46-50 and column 10, lines 12-15).

17. **As to claims 10, 11, and 22,** the claims are rejected for the same reasons as claim 1 above.

18. **As to claims 24-26,** the combination of Suzuki, Luthra, Thompson, Adams, and Konishi disclose the memory is configured to store the multiple sets of filter coefficients prior to receiving an input signal (Suzuki, column 9, lines 46-50 and column 10, lines 12-15), and wherein the filter function defined by each set of filter coefficients corrects distortion in an output signal produced by convolving the input signal with the interpolated coefficients based on the corresponding set of filter coefficients (Adams, column 2, lines 1-10; and Konishi, column 7, lines 27-37).

19. **As to claims 27-29,** the combination of Suzuki, Luthra, Adams, Thompson, and Konishi disclose wherein the output signal, resulting from the convolving step, is dependent on which single one of the independent sets of filter coefficients is selected, such that for the same input signal a different output signal would be produced if a different one of the independent sets of filter coefficients were selected (Suzuki, column 23, lines 5-51)

20. Claims 8, 9, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki in view of Luthra, Adams, Thompson, and Konishi and further in view of Auld et al. (hereafter Auld)(US Pat. 6,411,333).

Auld was cited in the previous office action dated 12/11/2009.

21. **As to claims 8, 9, 20, and 21,** the combination of Suzuki, Luthra, Thompson, Adams, and Konishi do not disclose the selected set of filter coefficients are interpolated according to a cubic spline algorithm, and each of the plurality of sets of filter coefficients comprise polyphase filter coefficients.

However, Auld discloses first selected set of filter coefficients are interpolated according to a cubic spline algorithm, and each of the plurality of sets of filter coefficients comprise polyphase filter coefficients (column 11, lines 46-50).

22. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Suzuki, Luthra, Thompson, Adams, and Konishi by having the first selected set of filter coefficients be interpolated according to a cubic spline algorithm, and each of the plurality of sets of filter coefficients comprise polyphase filter coefficients, as taught by Auld, for the benefit of effectively interpolating multi-dimensional data.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL YAARY whose telephone number is (571)270-1249. The examiner can normally be reached on Mon-Fri 9 a.m.-5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis Bullock can be reached on 571-272-3759. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. Y./
Examiner, Art Unit 2193

/Lewis A. Bullock, Jr./
Supervisory Patent Examiner, Art Unit 2193